Maternal Mortality at the University of Nigeria Teaching Hospital, Enugu, Before and After Kenya

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ABSTRACT

A comparative retrospective analysis of maternal deaths at the University of Nigeria Teaching Hospital, Enugu, Nigeria, was carried out for two ten-year periods — 1976–1985 and 1991–2000 — in order to evaluate the effect of Safe Motherhood Initiative on maternal mortality in the hospital. Variables for the two periods were compared by means of the t-test at 95% confidence level. Maternal mortality ratio was significantly higher in Period II than in Period I (1406 versus 270 per 100,000; p = 0.00). The leading causes of maternal death were uterine rupture for Period I and septicaemia for Period II. Although from the first to the second ten-year period there was a significant decrease in the number of midwives, physicians and nurse anaesthetists, there was more than a proportionate decrease in the number of deliveries. There was also increase in the incidence of anaemia due to diminished standards of living and in the mean decision-intervention interval (1.5 ± 0.5 versus 5.8 ± 1.2 hours; p = 0.000) as a result of worker dissatisfaction and changes in hospital policies. We conclude that since the launching of the Safe Motherhood Initiative, MMR at the University of Nigeria Teaching Hospital, Enugu, Nigeria, has increased five-fold as a result of institutional delays and a deterioration in the living standards of Nigerians, both consequences of a depressed economy. To halt this trend, we recommend that the living standard of all Nigerians should be improved. Furthermore, healthcare personnel should be motivated through enhanced salaries and provision of working materials including efficient mobile telephone services. (*Afr J Reprod Health* 2001; 5[2]:90-97)

RÉSUMÉ

Mortalité matrenelle au Centre Hospitalier Universitaire à Enugu, Nigéria: avant et après le Kenya. Une analyse retrospective comparée des décès maternels au Centre Hospitalier Universitaire à Enugu au Nigeria a été faite au cours de deux périodes de dix ans chacune — 1976–1985 et 1991–2000. Le but de l'analyse était d'évaluer l'effet de la Safe Motherhood Initiative sur la mortalité maternelle dans l'hôpital. Des variables pour les deux périodes ont été comparés à l'aide du test de t à un niveau de confiance de 95%. Le rapport de mortalité maternelle était, de manière significative, plus élevé dans la période II que dans la Période I (1406 par opposition à 270 par 100,000, p = 0,00). Les causes principales du décès maternel étaient la rupture de l'utérine pour la Période I et la septicémie pour la Période II. Bien que depuis la première jusqu'à la deuxième période de dix ans il y ait une baisse significative dans le nombre de sages-femmes, de médecins et d'infirmières anesthésistes, il y avait plus qu'une baisse proportionnelle dans le nombre d'accouchements. Il y avait également une augmentation de l'incidence d'anémie à cause du niveau de vie baissé et dans l'espace de la moyenne décision-intervention (1,5 ± 0,5 par opposition à 5,8 ± 1,2 heures; p = 0,000) à cause du mécontentement chez les salariés et des changements dans la politique de l'hôpital. Nous concluons que depuis qu'on a lancé la Safe Motherhood Initiative, le taux de mortalité maternelle a augmenté cinq fois au Centre Hospitalier Universitaire à Enugu, Nigéria, a cause des délais institutionnels et à cause de la déterioration du niveau de vie des Nigérians, deux conséquences d'une économie en déclin. Pour mettre fin à cette tendance, nous recommandons que le niveau de vie de tous les Nigérians soit amélioré. En plus, les membres du personnel du service de santé doivent être motivés à travers les salaires augmenté et en mettant à la disposition des membres du personnel tous les matériels du travail y compris les services du téléphone portable. (*Rev Afr Santé Reprod* 2001; 5[2]:90-97)

KEY WORDS: *Increasing, maternal mortality ratio, Enugu, Nigeria, Kenya*

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Introduction

Through the work of Harrison[1] and others, the attention of the world community was in the 1980s drawn to the high maternal mortality in developing countries including Nigeria. In 1986, the Society of Gynaecology and Obstetrics of Nigeria, an affiliate of the International Federation of Gynaecology and Obstetrics, during its international conference held in Enugu, Nigeria, focussed on maternal mortality. The proceedings of that conference have been published.[2] These and similar activities in other developing countries culminated in the launching of the Safe Motherhood Initiative (SMI) in Kenya in 1987. The call to action of the SMI demanded that health workers involved in the care of mothers and children took positive steps to reduce maternal morbidity and mortality.[3] The target of this initiative was the reduction of the estimated yearly world maternal mortality figure of 500,000 by 50% by the year 2000. The SMI was formally launched in Nigeria in 1990.

Established in 1970, the University of Nigeria Teaching Hospital, Enugu, was the first teaching hospital to be established in Eastern Nigeria. The obstetrics and gynaecology unit has 120 beds. Although a board of management runs the hospital, this board acts under the directives of the Nigerian Federal Ministry of Health.[4] Before and after SMI was launched in Kenya, some measures were taken to reduce maternal mortality ratio in the hospital. Following a previous study[5] that identified obstetric haemorrhage as the leading cause of maternal mortality in the hospital, all booked antenatal mothers were, from 1983, required to arrange for one unit of blood to be deposited in the hospital's blood bank. Such donations formed a pool from which those in need were transfused, while those who did not need transfusion forfeited theirs. After the formal launching of the SMI in Nigeria in 1990, the hospital served as the base for one of the Nigerian teams on prevention of maternal mortality (PMM) network. The Enugu team engaged in extensive operations research on PMM in Enugu and Anambra States of Nigeria.[6] Workshops were conducted for doctors and midwives who referred pregnant mothers to the UNTH, Enugu. Radio and television campaigns were also mounted on the need for pregnant mothers to seek help early. From 1993 upward, a weekly departmental meeting was held in conjunction with the Department of Paediatrics. During such meetings, each maternal or fetal death was critically discussed. The outcome of such meetings was discussed during meetings between the obstetrics and gynaecology department and the hospital management.

These efforts at reducing maternal mortality within the hospital occurred during the period that there were extreme socio-economic difficulties in Nigeria occasioned by the Structural Adjustment Programme (SAP) of the then Federal Military Government. During this period, the health sector, like all other sectors, suffered from underfunding, industrial unrest, inconsistent policies, and mass exodus of health care personnel from the public sector to either the private sector or foreign countries.

With the above background, the objectives of the present study were to compare the maternal mortality ratios at the UNTH, Enugu, before and after the launching of the SMI in Kenya and seek explanations for any differences observed.

Methods

Maternal deaths at the University of Nigeria Teaching Hospital, Enugu, Nigeria, were compared for the periods 1976–1999. Sources of data included the hospital's obstetric and other records including patients' folders, personal interviews and earlier studies of aspects of obstetric care in the hospital.[4,7,9] The variables compared for the two periods included maternal mortality ratios and their causes, incidence of anaemia, hospital policies, number of deliveries, proportion of unbooked mothers, number of doctors and nurses deployed to the obstetric unit, decision-intervention intervals, proportion of booked mothers arranging antenatal blood donation, etc.

Differences between variables for the two periods were compared by means of t-test at the 95% confidence level using the statistical package *SPSS* for Windows.

Results

During the period 1976–1985 (Period I), there were 47,361 live births and 127 maternal deaths, giving a maternal mortality ratio (MMR) of 270 per 100,000.[7] During the period 1991–2000 (Period II), there were 12,949 live births and 182 maternal

deaths, giving a MMR of 1406 per 100,000. The MMRs for the two periods differed significantly (p = 0.00). Figure 1 illustrates the trends in MMR and deliveries for the two periods. Among the booked patients, MMR was 86 per 100,000 during Period I, compared with 271 per 100,000 during Period II. Among unbooked patients, the MMR was 4,130 per 100,000 during Period I and 12,177 per 100,000 during Period II. The causes of maternal deaths are shown in Table 1. During Period I, the five leading causes of maternal deaths were uterine rupture (26.8%), obstetric haemorrhage (26.0%), hypertensive disorders (11.0%), septicaemia (10.2%) and obstructed labour (7.9%).[7] During Period II, the five leading causes of maternal deaths were septicaemia (25.3%), haemorrhage (18.1%), hypertensive disorders (13.2%), uterine rupture (11.5%) and obstructed labour (6.0%).

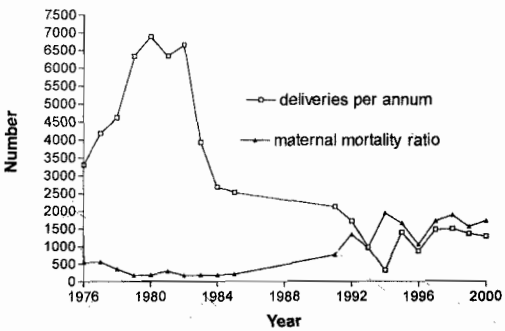


Figure 1 **Trends in Maternal Mortality Ratio and Number of Deliveries at the University of Nigeria Teaching Hospital, Enugu, Nigeria, for the periods 1976–1985 and 1991–2000**

In Table 2, some variables affecting maternal outcome are compared for the two periods. From the first to the second ten-year period, there was a significant decrease ($p < 0.05$) in the number of deliveries, midwives, physician and nurse anaesthetists, and the midwife:patient and doctor:patient ratios. In 1996, all nurse anaesthetists were disengaged from the services of the hospital as a result of rivalry between this group and physician anaesthetists. The mean yearly number of doctors in the obstetric unit did not significantly differ between the two study periods. In Table 2, the decision-intervention intervals for all cases of obstructed labour seen in June–September 1980 and June–September 1981 (79 cases) are compared with those seen in June–September 1995 and June–September 1996 (35 cases). Between the two study periods, there was a significant increase in the mean decision-intervention interval (1.5 ± 0.5 hours versus 5.8 ± 1.2 hours, $p = 0.0000$). Period I experienced one industrial action by doctors (1985), while Period II experienced six industrial actions by various categories of workers.

Table 1 **Causes of Maternal Death at the University of Nigeria Teaching Hospital, Enugu, 1976–1985 and 1991–2000**

	1976-1985		1991-2000	
Causes	**No**	**%**	**No**	**%**
Uterine rupture	34	26.8	21	11.5
Obstetric haemorrhage	33	26.0	33	18.1
Hypertensive disorders	14	11.0	24	13.2
Septicaemia	13	10.2	46	25.3
Obstructed labour	10	7.9	11	6.0
Anaesthetic	4	3.2	3	1.6
Amniotic fluid embolism	3	2.4	2	1.1
Jaundice in pregnancy	3	2.4	3	1.6
Congestive heart failure	2	1.6	3	1.6
Pulmonary embolism	2	1.6	4	2.2
Severe anaemia	2	1.6	3	1.6
Sickle cell disease	1	0.8	3	1.6
Transfusion reaction	1	0.8	0	0.0
Drug reaction	1	0.8	0	0.0
Road traffic accident	1	0.8	0	0.0
Breast carcinoma	1	0.8	3	1.6
Hepatoma	1	0.8	0	0.0
Tetanus	1	0.8	0	0.0
Abortions	NA*	NA	7	3.8
Ectopic pregnancy	NA	NA	6	3.3
Renal failure	NA	NA	3	1.6
Guillian Barre syndrome	NA	NA	1	0.5
Subarachnoid haemorrhage	NA	NA	2	1.1
Diabetic ketoacidosis	NA	NA	2	1.1
Total	127	100.00	182	100.0

**NA = Not available*

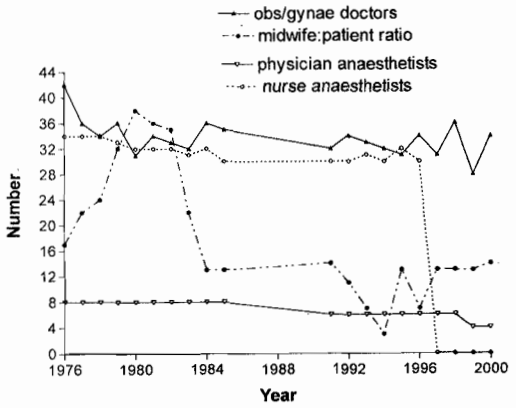
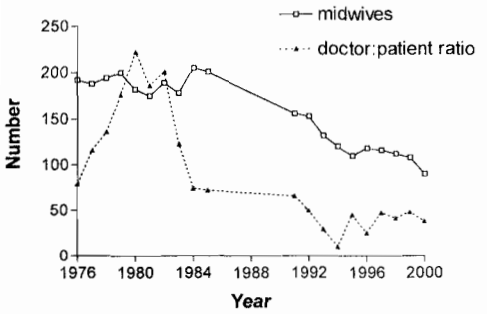


Figure 2 **Trends in the Number of Health Personnel at the University of Nigeria Teaching Hospital, Enugu, Nigeria**



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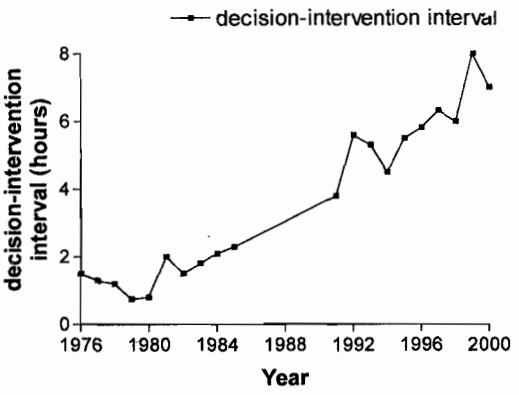

Figure 4 **Trends in the Decision-Intervention Interval at the University of Nigeria Teaching Hospital, Enugu, Nigeria**

During Period I, drugs and other materials required for the management of obstetric emergencies were collected without delay from the hospital's pharmacy. On discharge, the cost of such materials was included in the patient's discharge bill. During Period II, all patients, including emergency cases, were required to pay for materials before they could receive definitive care. During Period I, all disengaged staff were promptly replaced. From 1994 till 2000, the hospital, acting under the directive of the Federal Ministry of Health, placed embargo on employment for all categories of staff except for resident doctors whose employment was temporary. During the two study periods all patients undergoing operative delivery had prophylactic antibiotics prescribed for them. Between the two study periods, there was no difference in the proportion of booked patients arranging antenatal blood donation (Table 2). Telephone services were more efficient during Period I than in Period II. The trends in some of the variables over the periods studied are illustrated in Figures 2–4.

Discussion

The choice of the periods of study merits some comments. The year 1985 represents the period preceding the launching of Safe Motherhood Initiative (SMI). Measures aimed at reducing maternal mortality at the University of Nigeria Teaching Hospital, Enugu, Nigeria, started in 1983 with antenatal blood donation. The period 1986–1990 was the period when international awareness about the high maternal mortality in developing countries reached a peak, culminating in the international launching of the SMI in Kenya in 1987 and the local launching in Nigeria in 1990. This period saw increased activities aimed at reducing maternal mortality at the UNTH. These are more elaborately discussed in the introduction. The period 1991–2000 was therefore a period when maternal mortality was expected to fall as a result of these measures.

The rise, instead of a fall, in MMR recorded in the present study was, therefore, contrary to expectation. According to Harrison,[10] safe motherhood is dependent on three key factors, namely, good general living standards; provision of professional antenatal care; and effective measures for tackling obstetric complications. We shall examine the re-

sults obtained in the present study in relation to these three factors. Although the first factor, good general living standards, lies outside the ambit of a hospital, there is evidence that the standard of living of Nigerians was better in Period I than in Period II. If anaemia is used as an index of standard of living and is defined as haemoglobin concentration of less than 11 grams per 100 millilitres, it is seen that the incidence of anaemia amongst antenatal mothers seen at the UNTH, Enugu, doubled from 33.7% in 1979[8] to 67.4% in 1990[9]. Such deterioration in the standard of living may therefore partly explain the higher MMR in the latter period. With regard to the second factor, the provisional antenatal care, over 90% of the antenatal population received antenatal care during both study periods (Table 2). However, despite the higher MMR among unbooked mothers during both study periods, the three-fold increase in MMR in both booked and unbooked women from the first to the second study period suggests that another factor must have been more important than lack of antenatal care in explaining the higher MMR during Period II. This brings to focus the third factor, the provision of effective measures for tackling obstetric complications. This requires that both human and material resources are available at the shortest possible time when these complications arise or present.

With regard to human resources, Table 2 and Figures 2 & 3 show that the mean yearly number of doctors did not differ significantly between the two study periods. In contrast, the number of midwives and physician and nurse anaesthetists was significantly lower in the second period than in the first, because of the embargo on employment of permanent staff. This suggests that shortage of these categories of staff might have contributed to the higher maternal mortality during the second period. However, as depicted in the doctor:patient and midwife:patient ratios in Table 2 and Figures 2 & 3, the workload for both doctors and nurses was significantly lower in the second period than in the first. Based on this, there appears to have been sufficient personnel for the available work during both periods.

Table 2 **Factors Affecting Maternal Outcome at the University of Nigeria Teaching Hospital, Enugu, for 1976–1985 and 1991–2000**

	1976-1985		1991-2000		
Cause	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Midwives (yearly mean)	190	10.0	122	20.0	0.000
Obstetric doctors (yearly mean)	35	3.0	33	2.0	NS*
Physician anaesthetists	8	0.0	5.6	0.8	0.000
Nurse anaesthetists	32	1.0	18	16.0	0.02
Midwife:Patient ratio	1:25	9	1:10	4.0	0.001
Doctor: Patient ratio	1:139	55	1:40	5.0	0.000
Decision interval (hours)	1.5	0.5	5.8	1.2	0.000
Deliveries	4,736	1,685	1,295	495	0.000
Percentage of unbooked mothers donating blood	26.0	9.9	24.1	6.1	NS
Percentage unbooked	5.7	7.7	7.8	1.5	NS
MMR (unbooked) per 100,000	4,130	—	12,177	—	—
MMR (booked) per 100,000	86	—	271	—	—
Strikes	1	—	6	—	—
% grandmultiparous	20.9	0.8	12.3	1.7	0.04
% of mothers aged > 35 years	4	0.5	3.5	0.4	NS

**NS = Not statistically significant at the 95% confidence level.*

Table 3 **A Registrar's Monthly Salary at the University of Nigeria Teaching Hospital, Enugu, for 1976–1985 and 1991–2000**

Year	NER*	BER**	Salary in Naria	Salary in Dollars
1976	0.63	0.84	423.00	503.57
1977	0.65	1.35	423.00	313.33
1978	0.61	1.11	423.00	381.08
1979	0.59	0.98	423.00	431.63
1980	0.55	0.93	423.00	454.84
1981	0.61	0.93	639.00	687.10
1982	0.67	1.23	716.00	582.11
1983	0.72	4.17	740.00	177.46
1984	0.76	3.57	818.00	224.10
1985	0.89	3.70	939.00	253.78
1991	9.90	15.57	1,213.00	77.90
1992	17.29	22.78	2,990.00	131.26
1993	22.33	46.18	3,952.80	85.60
1994	21.88	90.25	6,621.91	73.37
1995	21.88	87.05	8,790.49	100.98
1996	22.00	86.20	17,691.14	205.23
1997	22.00	91.20	17,691.00	193.98
1998	22.00	95.42	17,691.00	185.40
1999	96.00	96.00	30,000.50	312.00
2000	115.00	115.00	50,000.00	434.78

*NER = *Nominal Exchange Rate* **BER = *Black Market Exchange Rate*

Source: The figures for the NER were obtained from several issues of the Central Bank of Nigeria's (CBN) Statistical Bulletin. Figures for BER were obtained from Pick Currency Yearbook 1990 (for 1976-1985), while the remaining information were obtained from various issues of the Nigeria Deposit Insurance Company Quarterly.

Note: Conversion to US dollar equivalents was done using the BER, since the NER was available mainly to government officials.

Having the right number of staff is one thing, motivating them for enhanced productivity is another.[10] A previous study[4] shows that during Period II, the hospital had a workforce demoralised by inadequate remuneration, delay in payment of salaries and lack of promotion. This situation is affirmed by findings in the present study of six industrial actions by various categories of staff during Period II, compared with only one during Period I. The lack of job satisfaction led to mass exodus of health care personnel from the hospital, as shown in the significant reduction in the absolute number of midwives and physician and nurse anaesthetists in the hospital from the first to the second period (Table 2, Figures 2 & 3).

Additionally, during the first half of Period II, workers' monthly salaries could hardly be sufficient for them for the first week of the following

month. To illustrate this clearly, the monthly salary of a registrar during the two periods is shown in Table 3. Because of several devaluations of the Nigerian currency, salaries were converted to their American dollar equivalents, since the dollar was more stable throughout the two periods. Because of these poor salaries, those who remained in the hospital's service during Period II had to look for other means of supplementing their salaries by engaging in private businesses. The result of this was that in emergency situations, one or more of the staff needed for quick intervention might not be immediately available, thereby creating delays. Such a practice was particularly common amongst haematologists, pharmacists, anaesthetists, orderlies and other line staff. These categories of staff were not under direct supervision of the Head of Department of Obstetrics and Gynaecology. On the contrary, members of the obstetric team under his direct supervision were usually available within the hospital premises 24 hours of the day. Efforts to discipline erring staff through their heads of department were hardly ever successful because of the tendency to protect likes.

Even where all the required staffs were available for a case, lack of materials to work with further impeded their performance. During Period II, the policy whereby patients were required to purchase needed materials before they could receive definitive care created additional delays if patients did not have physical cash to purchase these items. The above factors explain the significantly increased decision-intervention interval from 1.5 ± 0.5 hours in Period I to 5.8 ± 1.2 hours in Period II (Table 2 & Figure 4). Such delays are recognised as important causes of maternal mortality[12] and account largely not only for the higher MMR during Period II, but also for the change in the order of the causes of maternal death.

Septicaemia rose from the fourth position in Period I to the first position in Period II. The explanation for this is that whereas during Period I, prescribed antibiotics were promptly administered, during Period II, how soon the patient provided the prescribed antibiotics determined the time medication was initiated. In some cases these took over 48 hours, by which time septicaemia might have set in.

It is concluded that since the launching of the Safe Motherhood Initiative, MMR at the University of Nigeria Teaching Hospital, Enugu, Nigeria, has increased five-fold as a result of institutional delays and deterioration in the living standards of Nigerians; both consequences of a depressed economy. To halt this trend, it is recommended that the living standards of all Nigerians should be improved. Furthermore, healthcare personnel should be motivated through enhanced salaries and provision of working materials including efficient mobile telephone services.

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